WIND ROTOR

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Abstract

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(54) Wind Rotor

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ABSTRACT OF THE DISCLOSURE

Described herein is a rotor for a wind rotor device. The rotor comprises a pair of elongated wings having a curved, e.g., semi-circular, cross-section and arranged in axial direction about a geometrical axis in a symmetrical fashion such that the concave sides of the wings partially overlap each other, defining an axial passage between the inner edges of the wings, the wings being twisted in a screw-shaped manner in relation to one another. A shaft extends in the direction of the geometrical axis and connects one end of the rotor to a frame in a rotatable manner. A plurality of elongated, generally blade-like support ribs rigidly interconnect, at axially spaced intervals, the outer edge of each wing with the inner edge of the other wing. The cross-section of the ribs is convex in one axial direction of the rotor. This rib arrangement increases the stability of the rotor and, at the same time, improves the wind flow conditions within the rotor.

(Fig. 6)

Wind Rotor

The present invention concerns a rotor for a wind rotor device of a type disclosed in the PCT Publication WO 81/01443. Such a prior art device comprises:

- a base;
- a frame pivotably connected to the base;
- a rotor comprising a pair of elongated wings having an outer and an inner edge and a curved, e.g., semicircular, cross-section and arranged in axial direction about a geometrical axis in a symmetrical fashion such that the concave sides of the wings partially overlap each other, defining an axial passage between the inner edges of the wings, the wings being twisted in a screw-shaped manner in relation to one another;
- a shaft extending in the direction on the geometrical axis and connecting one end of the rotor to the frame in a pivotable manner; and
- means for resiliently keeping the rotor in a first axial direction in relation to the frame but allowing the rotor to pivot as a function of the wind strength influencing on the rotor.

The prior art rotor has the drawback of not being rigid enough to withstand high wind velocities, particularly if kept in upright position whereby the wings tend to separate.

It is an object of the present invention to eliminate the above drawback and, at the same time, make a wind rotor of the above type more efficient.

The invention is based on the idea that by providing a rotor of the above type with spaced wing-shaped (or blade-shaped) support ribs rigidly interconnecting the edges of the wings, particularly advantageous stability and wind flow conditions within the rotor are achieved.

The rotor according to the invention is mainly characterized by

> a plurality of elongated, generally blade-like support ribs rigidly interconnecting, at axially spaced intervals, the outer edge of each wing with the inner edge of the other wing, said ribs being arranged in a substantially prependicular relationship to the geometrical axis, and the cross-section of the ribs being convex in one and same direction of the geometrical axis.

The novel rotor has a number of advantages over the prior art constructions.

The blade-shaped support ribs guide the wind flow in the axial direction of the rotor. As no support plates are necessary at the axial ends of the rotor, the rotor functions equally well in the horizontal as in the vertical position.

By using a plurality of support ribs, a particularly rigid and stable construction is achieved.

The blade-like ribs make it possible for the rotor to pivot without changing the correct flow direction within the rotor. In the horizontal position, the support ribs function as the blades of a turbine, increasing the over all efficiency thereof.

The rotor according to the invention will be examined in more detail, reference being made to the attached drawing, in wich:

Fig. 1 is a perspective view of one ambodiment of the rotor according to the invention.

Fig. 2 is a persepctive view of a second embodiment of the invention.

Fig. 3 is an axial cross section of the embodiment of Fig. 1.

Fig. 4 shows perspective views of three different support rib shapes.

Fig. 5 is a perspective view of a shaft and rib arrangement of a third embodiment of the invention.

Fig. 6 is a perspective view on an enlarged scale of a fourth embodiment of the invention.

The rotor according to the invention comprises a pair of elongated wings 1, 2 having a curved, prefereblу semi-circular, cross section. The wings 1, 2 are arranged in axial direction about a geometrical axis in a symmetrical fashion such that the concave sides of the wings 1, 2 partially overlap each other. Thereby an axial passage is defined between the inner edges of the wings 1, 2. The wings 1, 2 are twisted in a screw-shaped manner in relation to one another by substantially 180°. The length of the rotor is preferably at least 4 times its diameter.

A shaft 3 extends in the direction of the geometrical axis and is connected at one end to a frame (not shown) in a rotatable manner. As discussed above, the connection may also be pivotable. In that case means are provided for resiliently keeping the rotor in a first axial direction in relation to the frame but allowing the rotor to pivot as a function of the wind strength influencing on the rotor.

A plurality of elongated, generally blade-like support ribs 4, 4', 4" rigidly interconnect, at axially equidistant intervals, the outer edge of each wing 1, 2 with the inner edge of the other wing 2, 1. Said ribs

4, 4', 4" are arranged in a substantially perpendicular relationship to the geometrical axis and their cross section is convex in the upper direction of the rotor.

As seen in Fig. 4, the cross section may consist of a convex upper side and a linear lower side (embodiment A). The cross-section may also have a concave lower side (embodiments B and C).

The shaft 3 may extend over the whole axial length of the rotor as is the case in Figures 1 and 6, or the rotor may be constructed with only a short shaft portion 3 (Fig. 2).

A particularly strong construction can be achieved by using ribs extending from the outer edge of one wing 1, via the inner edges of the other wing 2 and said one wing 1, to the outer edge of the other wing 2. Such a rib is indicated in Fig. 6 by the reference numeral 5.

The ribs 4 guide the inflowing air in the axial direction of the wings 1, 2. The ribs 4 have a profile close to that of the wings of an air-craft. Such a form gives a particularly rigid structure in which the ribs can be made rather thick without impairing the flow conditions.

The curved plate-like rib structure 4 (cf. Figures 2 and 4) is a preferred embodiment in the sense that it saves material and has a form similar to the blades of a turbine.

The ribs 4, 4', 4" are preferably made of metal, whereas the wings 1, 2 can be made of metal or plastic. The connections between the ribs and the edges of the wings can be made by welding, riveting or cementing in a way known per se.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A rotor for a wind rotor device with a frame, comprising:

- a pair of elongated wings having an outer and an inner edge and a curved, e.g., semi-circular, cross-section and arranged in axial direction about a geometrical axis in a symmetrical fashion such that the concave sides of the wings partially overlap each other, defining an axial passage between the inner edges of the wings, the wings being twisted in a screw-shaped manner in relation to one another;
- a shaft extending in the direction of the geometrical axis and being connected at one end to the frame in a rotatable manner; and
- a plurality of elongated, generally blade-like ribs rigidly interconnecting, at axially spaced intervals, the outer edge of each wing with the inner edge of the other wing, said ribs being arranged in a substantially perpendicular relationship to the geometrical axis, and the cross-section of the ribs being convex in one and same direction of the geometrical axis.

2. A rotor as claimed in Claim 1, wherein the cross-section of the ribs is substantially linear in the opposite direction of the geometrical axis.

3. A rotor as claimed in Claim 1, wherein the cross-section of the ribs is substantially concave in the opposite direction of the geometrical axis.

4. A rotor as claimed in Claim 1, wherein the shaft extends over the whole axial length of the rotor.

5. A rotor as claimed in Claim 1, wherein the wings are twisted in relation to one another by substantially 180 degrees.

6. A rotor as claimed in Claim 1, wherein the length of the rotor is at least 4 times its diameter.

7. A rotor as claimed in Claim 1, wherein each rib extends from the outer edge of one wing, via the inner edges of the other wing and said one wing, to the outer edge of the other wing, thus rigidly interconnecting both edges of both wings.

8. A rotor as claimed in Claim 1, wherein the axially spaced intervals are equidistant.

9. A rotor as claimed in Claim 1, wherein the general planes of the blade-like support ribs substantially lie in radial planes of the geometrical axis.

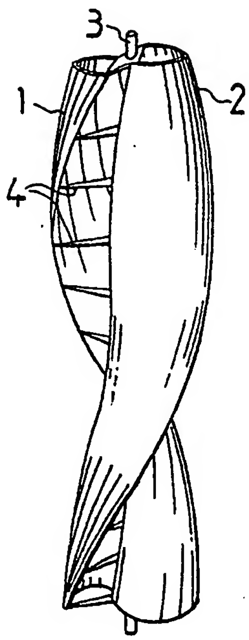


Fig. 1

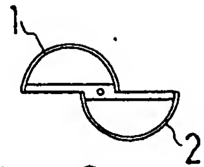


Fig. 3

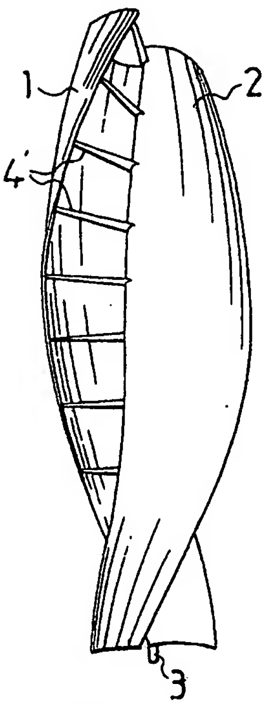


Fig. 2

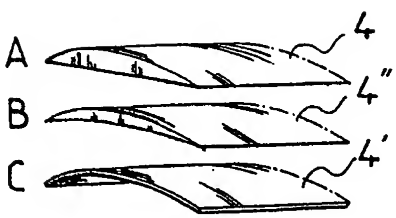


Fig. 4

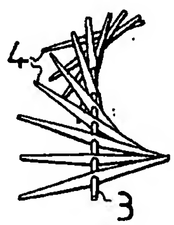
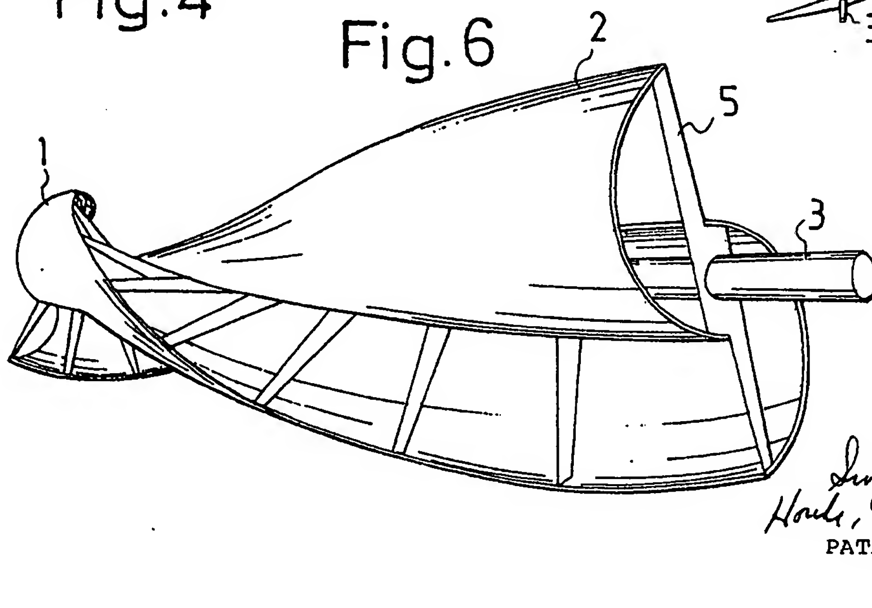


Fig. 5

Fig. 6



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